

WE CLAIM:

1. A method for inducing stem cells to differentiate into neuronal cells comprising:
 - a) culturing said stem cells with basic fibroblast growth factor;
 - b) culturing the cells of step a) with fibroblast growth factor 8 and Sonic Hedgehog;
 - c) culturing the cells of step b) with brain-derived neurotrophic factor;
 - d) co-culturing the cells of step c) with astrocytes.
2. The method of claim 1, wherein the co-culture of step d) is performed in the presence of a supplement comprising insulin, transferrin, selenite, putrescine and progesterone.
3. The method of claim 1, wherein the co-culture of step d) is performed in the presence of N2 supplement®.
4. The method of claim 1, wherein said cells are cultured according to steps (a) through (d) for at least seven days at each step.
5. The method of claim 1, wherein the stem cells are mammalian stem cells.
6. The method of claim 1, wherein the stem cells are human stem cells.
7. The method of claim 1, wherein the stem cells are selected from the group consisting of neural stem cells, multipotent adult progenitor cells (MAPCs), embryonic germ cells, and embryonic stem cells.
8. The method of claim 1, wherein the stem cells are MAPCs.
9. The method of claim 1, wherein the stem cells are isolated from bone marrow, placenta, muscle, brain, spinal cord, blood, and skin.
10. The method of claim 1, wherein the stem cells are isolated from bone marrow.
11. The method of claim 1, wherein said neuronal cells are selected from the group consisting of dopaminergic neurons, serotonergic neurons, GABA-ergic neurons and combinations thereof.
12. A neuronal cell produced by the method of claim 1.

13. A method for inducing cells to differentiate into neuronal cells comprising co-culturing the cells with astrocytes, said cells having gone through the steps of:

- a) culturing stem cells with basic fibroblast growth factor;
- b) culturing the cells of step a) with fibroblast growth factor 8 and Sonic Hedgehog;
- c) culturing the cells of step b) with brain-derived neurotrophic factor.